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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,820	03/11/2004	Tetsuo Shibamura	09792909-5843	7109

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EXAMINER
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YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

DATE MAILED: 06/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/798,820	<b>Applicant(s)</b> SHIBANUMA ET AL.	
	<b>Examiner</b> Marie R. Yamnitzky	<b>Art Unit</b> 1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 February 2006 and 27 March 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 11-13, 16-19, 22-25, 28-31 and 34-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-13, 16-19, 22-25, 28-31 and 34-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

1. This Office action is in response to applicant's amendments received February 13, 2006 and March 27, 2006. The specification and claims 11, 12, 16-18, 22-24, 29, 30 and 34 have been amended. Claims 14, 15, 20, 21, 26, 27, 32 and 33 have been cancelled.

The examiner notes that the correct status identifier for claims 13, 19, 25, 28, 31 and 35-42 is "(Previously Presented)", rather than "(Original)", as these claims were added by preliminary amendment.

Claims 11-13, 16-19, 22-25, 28-31 and 34-42 are pending.

2. The objection to the disclosure for informalities, as set forth in Office action mailed October 31, 2005, is overcome by applicant's amendment of the specification.

Some of the issues raised in the rejections under 35 U.S.C. 112, 1<sup>st</sup> paragraph (written description requirement), as set forth in the Office actions mailed October 31, 2005 and November 08, 2005 are overcome by applicant's amendment. Remaining issues are set forth later in this action.

The rejection of claims 11, 17, 23, 29 and 35-42 under 35 U.S.C. 112, 1<sup>st</sup> paragraph, as failing to recite a critical/essential feature is overcome by applicant's amendment of claims 11, 17, 23 and 29.

The issues raised in the rejections under 35 U.S.C. 112, 2<sup>nd</sup> paragraph, as set forth in the Office actions mailed October 31, 2005 and November 08, 2005 are overcome by claim amendment.

The provisional obviousness-type double patenting rejection set forth in the Office action mailed November 08, 2005 is moot. The examiner notes that in the rejection, the copending application was identified by an incorrect application number; the correct number is 11/062,076. Application No. 11/062,076 is now abandoned.

The rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) based on Forrest et al. (WO 99/53724) are overcome by claim amendment.

The rejection under 35 U.S.C. 102(b) based on Nakada et al. (EP 0 564 224 A2) is overcome by claim amendment.

3. Claims 11-13, 16-19, 22, 29-31, 34-38, 41 and 42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Support for a propylcyclohexyl group, a dipropylcyclohexyl group, and a tripropylcyclohexyl group as recited in claim 11 is not clear. The examiner does not find these groups explicitly named as possibilities for R<sup>1</sup> and R<sup>2</sup> in the original disclosure, or shown in the formulae on pages 17-52 of the specification.

The application, as originally filed, does not provide support for the subgenus of compounds of formula (II) as defined in independent claim 17. Formula (II) as defined in claim 17 provides compounds which, while within the generic scope of compounds originally defined,

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are not explicitly disclosed in the original disclosure. For example, while the original disclosure provides examples of compounds in which two of  $R^3-R^5$  are hydrogen while the third is phenyl, naphthyl or fluorenyl, the original disclosure provides insufficient support for a compound in which one of  $R^3-R^5$  is phenyl, while one of  $R^3-R^5$  is naphthyl and one of  $R^3-R^5$  is fluorenyl.

Support for the negative limitation “but do not form an interlocking macrocyclic compound”, as recited in independent claim 29, is not clear. The examiner does not find this negative limitation recited in the original disclosure.

4. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Proper antecedent basis is lacking for “the hole transporting layer”. The device of claim 17, from which claim 22 depends, has “one or more hole transport layers”. It is not clear if claim 22 is to be interpreted as requiring “only one” or “at least one” or “all” hole transport layers to be luminescent.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 11-13, 17-19, 23-25 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakada (EP 0 564 224 A2).

Nakada's device of Example 2 is similar to a device as claimed in present claims 11-13 and 17-19.

The compound of formula (40) as shown on page 14, which is utilized in an electron transport layer in the electroluminescent device of Example 2 (p. 27), is a homolog of a compound of formula (I) as defined in present claim 11 wherein each of  $R^1$  and  $R^2$  is an alkyl group having at least two carbons such as an ethyl group, propyl group, etc. The compound of formula (40) is also a homolog of a compound of formula (II) as defined in present claim 17 wherein  $R^3$  and  $R^4$  are independently selected from hydrogen and methyl, and  $R^5$  is methyl. (For example, a compound of present formula (II) wherein each of  $R^3$  and  $R^4$  is hydrogen, and  $R^5$  is methyl, is a compound having an ethyl group in place of each of the methyl groups of Nakada's compound (40).) Nakada's compound (40) is a compound of formula (I) wherein each of  $R^1$  and  $R^2$  is an alkyl group having one carbon, and a compound of formula (II) wherein each of  $R^3$ ,  $R^4$  and  $R^5$  is hydrogen. Nakada et al. suggest that any alkyl group may be used as a substituent on the phenanthroline ring structure (e.g. see p. 2, l. 23-40). It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make compounds similar to the specific compounds disclosed by Nakada et al. with the expectation that similar compounds would have similar properties and could be used for the same purpose. One of ordinary skill in the art at the time of the invention would have reasonably expected that compounds having an alkyl group of two or more carbons, such as an ethyl group or propyl group, in place of one or

both of the methyl groups in Nakada's compound (40) would have similar properties to compound (40) and could be used for the same purpose. Compounds which are homologs are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties.

Nakada's device of Example 2 is also similar to a device as claimed in present claims 23-25 and 29-31.

Nakada's compound of formula (40) is a 1,10-phenanthroline derivative having an unsubstituted aryl (phenyl) group at the 4- and 7-positions, and an alkyl (methyl) group at the 2- and 9-positions of the 1,10-phenanthroline.

The 1,10-phenanthroline derivatives that may be used for Nakada's devices may have one or more substituted or unsubstituted aryl groups as substituents at any of the 2- to 9-positions of the 1,10-phenanthroline. For example, see page 2, lines 23-41.

The bathophenanthroline compounds defined in present independent claims 23 and 29 are 1,10-phenanthroline derivatives having an unsubstituted aryl (phenyl) group at the 4- and 7-positions, and having an aromatic group selected from specific groups at the 2- and 9-positions. The specific groups set forth in claim 23 include alkyl-substituted phenyl groups ("4-propylphenyl...tert-butylphenyl group"). The specific groups set forth in claim 29 include a 1-naphthyl group, various alkyl-substituted phenyl groups ("4-methylphenyl...tert-butylphenyl group") and an aryl-substituted phenyl group ("phenylphenyl").

Nakada discloses 1,10-phenanthroline derivatives having substituents at the 2-, 4-, 7- and 9-positions, including compounds having an unsubstituted phenyl group at the 4- and 7-positions

(e.g. see formula (40) on p. 14), and including compounds having an aryl group at the 2- and 9-positions (e.g. see formula (41) on p. 15 and formula (47) on p. 16). Nakada discloses 1,10-phenanthroline derivatives substituted with 1-naphthyl groups at the 2- and 9-positions (formula (47)). Nakada also discloses 1,10-phenanthroline derivatives substituted with alkyl-substituted phenyl groups or aryl-substituted phenyl groups (formulae (42), (43) and (44)). Nakada does not disclose any specific example of a 1,10-phenanthroline derivative having an unsubstituted phenyl group at the 4- and 7-positions and any of the specific aryl groups recited in present claims 23 and 29 at the 2- and 9-positions, though derivatives within the scope of compounds of formula (III) as defined in claims 23 and 29 are within the scope of Nakada's disclosure.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make 1,10-phenanthroline derivatives within the scope of Nakada's disclosure and similar to the specific derivatives disclosed by Nakada, and use those derivatives to make organic EL devices, with the expectation that 1,10-phenanthroline derivatives that are similar in structure would have similar properties and could be used for Nakada's purposes. For example, one of ordinary skill in the art at the time of the invention, given Nakada's compounds of formulae (40), (41) and (47), would have reasonably expected that compounds having a phenyl group at each of the 2-, 4-, 7- and 9-positions, or compounds having a phenyl group at each of the 4- and 7-positions and a 1-naphthyl group at each of the 2- and 9-positions, would have similar properties and could be used in an organic EL device as taught by Nakada. One of ordinary skill in the art also would have expected that similar compounds having alkyl-substituted phenyl groups or aryl-substituted phenyl groups would have similar properties and



could be used for Nakada's purposes since Nakada discloses alkyl-substituted phenyl groups and aryl-substituted phenyl groups as substituents.

Although Nakada et al. describe the layer made of compound (40) as an electron transport layer rather than a hole-blocking layer, an electron transport layer made of compound (40) or compounds similar to compound (40) will also inherently function as a hole-blocking layer. While present independent claims 11, 17, 23 and 29 require an electron transport layer and a hole-blocking layer, the claim language does not explicitly require the functions of electron transport and hole-blocking to be provided by two distinct layers.

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 11-13, 16-19, 22-25, 28-31 and 34-42 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-7 of U.S. Patent No. 6,524,728 B1 for reasons of record in the Office action mailed October 31, 2005 with the following modification.

The October 31<sup>st</sup> Office action referred to bathophenanthroline derivatives represented by formulae (I), (II) and (III). The formula in claim 29 has been redesignated as formula (IV). There is substantial overlap between the bathophenanthroline derivative as defined in the patented claims and the bathophenanthroline derivatives represented by formulae (I), (II), (III) and (IV) as defined in the present claims.

9. Applicant's arguments filed February 13, 2006 have been fully considered but they are not persuasive.

Regarding the rejection of claim 11 and dependents under 35 U.S.C. 112, 1<sup>st</sup> paragraph, applicant argues that support for a propylcyclohexyl group, a dipropylcyclohexyl group, and a tripropylcyclohexyl group (as recited in claim 11) is provided by Compounds 9-27 and paragraphs [0033]-[0035]. Clarification is required. The paragraphs of the specification are not numbered, and the examiner may not be counting the paragraphs the same as applicant. None of the compounds have the named groups. It is not clear to the examiner how the recited groups are derived from/supported by the original disclosure.

Regarding the rejection of claim 17 and dependents under 35 U.S.C. 112, 1<sup>st</sup> paragraph, applicant argues that the amendment obviates the rejection. The examiner respectfully disagrees

as independent claim 17 defines a subgenus of compounds not fully supported by the original disclosure.

Regarding the rejection of claim 29 and dependents under 35 U.S.C. 112, 1<sup>st</sup> paragraph, applicant's remarks indicate that the questioned claim language has been deleted, but it has not.

With respect to the rejection based on Nakada et al., applicant argues that the prior art devices have different layers and different structures than those of the present claims. Applicant argues that Nakada's devices do not include a hole-blocking layer and, in Nakada's devices, the phenanthroline compounds are included in an electron transport layer rather than a hole-blocking layer. Applicant argues that Nakada's devices emit light from an emitting layer which is sandwiched between a hole transport layer and electron transport layer whereas in the present devices, light emission occurs mainly from a luminescent hole transport layer.

Nakada's compounds are inherently capable of transporting electrons and blocking holes in Nakada's devices. Nakada's electron transport layer made of a phenanthroline compound also inherently functions as a hole-blocking layer. While the present claims require an electron transport layer and a hole-blocking layer, the claim language does not explicitly require the functions of electron transport and hole-blocking to be provided by two distinct layers. Compare the language of present claim 11, for example, to the language of prior claim 14. Prior claim 14 clearly required an electron transporting layer separate from a hole blocking layer in requiring "an electron transporting layer between the first electrode and the hole blocking layer". (The present claims do not limit the arrangement of the different layers relative to each other and/or relative to the first and second electrode.)

Regarding light emission from a luminescent hole transport layer, the claims rejected as unpatentable over Nakada et al. do not require the hole transport layer to be a luminescent layer. Further the present claim language is open and does not restrict the claimed device from comprising a separate emitting layer such as in Nakada's devices.

Applicant's responses filed February 13, 2006 and March 27, 2006 are silent with respect to the obviousness-type double patenting rejection based on U.S. Patent No. 6,524,728 B1.

10. Miscellaneous:

In claim 11, the phrase "wherein at least one of  $R^1$  and  $R^2$  has a least two carbons" is superfluous since all members of the Markush group from which  $R^1$  and  $R^2$  are selected have at least two carbons.

In the eleventh line after formula (I) in claim 11, "an propylcyclohexyl" should read --a propylcyclohexyl--.

In the twelfth line after formula (I) in claim 11, "group]" should read --group--.

In the thirteenth line after formula (I) in claim 11, "2-ethylhexyl" should read --2-ethylhexyl--.

In the first line of claim 23, --comprising-- should be inserted after "device".

In the third line after formula (III) in claim 23, the comma after "a" should be deleted.

The sixth line after formula (III) in claim 23 includes three chemical names, each ending in "oryl". In each case, "oryl" should apparently read --olyl-- to indicate the monovalent form of benzoxazole, benzothiazole and benzoimidazole groups (emphasis added).

In the fifth line after formula (IV) in claim 29, “a” (last occurrence) should read --an--.

Clarification regarding the title of the present application is required. Some of the papers filed with the present application, such as the application transmittal letter and cover sheet for the specification, give the title as “Optical Recording Medium”. The application was pre-grant published with this title. However, the executed declaration gives the title as “BATHOPHENATHROLINE COMPOUND AND PROCESS FOR PREPARING THE SAME”. Page 1 of the specification gives the title as “BATHOPHENANTHROLINE COMPOUND AND PROCESS FOR PREPARING THE SAME”. (Note the difference in spelling of the first word in the declaration and page 1 of the specification.)

11. Note that the miscellaneous issues raised above consist of issues raised in the Office action mailed October 31, 2005 that were not explicitly addressed in applicant’s response, and new issues raised by applicant’s response.

12. Applicant’s amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY  
June 07, 2006



MARIE YAMNITZKY  
PRIMARY EXAMINER

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